Low-Cost and Efficient Flight Operations for SIRTF

Marie-Jose Deutsch

The Space Infrared Telescope Facility (SIRTF), the fourth of the Great Observatories, will be placed in a unique solar orbit trailing the Earth, in 2001. SIRTF will acquire both imaging and spectral data using large infrared detector arrays from 3.5μm to 160μm. The primary science objectives are (1) search for and study of brown dwarfs and super planets, (2) discovery and study of protoplanetary debris disks, (3) study of ultraluminous galaxies and active galactic nuclei, and (4) study of the early Universe.

Driven by the limited cryogenic lifetime of 5 years, and the severely cost-capped development, the SIRTF mission has been designed to minimize complexity. A Mission Planning and Operations system is being implemented that will result in high efficiency and low-cost operation, yet will accommodate rapid response science requirements.

SIRTF's operations architecture is accommodating a shared science and flight operations system. Crucial to this effort is the philosophy of an integrated science and engineering plan, co-location, cross-training of teams and common planning tools.

The common tool set will enable the automatic generation of an integrated and conflict free planned schedule accommodating 20 000 observations and engineering activities a year. The shared tool set will help generate standard observations, engineering activities and manage the ground and flight resources and constraints. The ground in synergy with the flight system will accommodate the development of robust but flexible sequences of activities. The "virtual language" architecture enables the ground system to take advantage of extra time between observations, and missed or failed observations on the fly without affecting subsequent scheduled activities. Late updates have thus become trivial and provide great flexibility to incorporate newly discovered science opportunities or health issues late in the process. This shared science and flight operations will provide a low-cost operations system.

SIRTF being the last of the "Great Observatories" and a precursor in the "Origins" mission series will contribute to the validation of new and improved architectures for astronomy missions at costs more closely resembling those of Explorer class missions.